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Design and Development of an Online Catering Ordering Information System Using the Prototype Methodology

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Abstract

This study develops a web-based online catering ordering system to address issues in traditional catering, such as manual order errors, delayed information delivery, and data inconsistencies. Using the Prototype methodology, the system was iteratively designed with user feedback to ensure functionality and usability. The primary goals are to enhance operational efficiency, improve service accuracy, and deliver a seamless digital experience. Key features include user registration, secure login, interactive menu selection (à la carte or buffet), dynamic order forms for specifying portions and delivery dates, and admin tools for order management and automated sales reporting. The interface is responsive, accessible across devices, with non-functional requirements ensuring data encryption, 24/7 availability, and sub-2-second response times. The development followed the Prototype lifecycle: requirements gathering, system design (using ERD, Use Case, Class, Activity, and Sequence Diagrams), web-based implementation, black-box testing, and ongoing maintenance for bug fixes and performance optimization. Testing validated reliable login, ordering, and payment processes, handling edge cases effectively. This system streamlines catering operations, reduces errors, and enhances customer satisfaction, offering a scalable solution for food services. Future enhancements may include mobile app integration and advanced analytics..

INTRODUCTION

In today's digital era, various services have shifted to online-based systems to improve efficiency. One such service is food ordering, including catering. The manual systems still used by many catering businesses often create several problems, such as errors in order recording, delays in information delivery, and inconsistencies in managed data [1], [2].

Previous research has revealed that catering orders managed manually can lead to mistakes in recording orders and difficulties in managing customer data. This indicates the need for the development of a web-based catering ordering information system to enhance efficiency and accuracy in the ordering process [3] [4]. In addition, studies have emphasized the importance of online food ordering systems in improving customer convenience and operational efficiency for food service providers. Such systems allow customers to easily place orders online, while service providers can manage orders and customer data more effectively. Other studies have also shown that the use of mobile applications in catering ordering systems can increase business process effectiveness and reduce the risk of errors in order recording [5], [6], [7].

Based on the problems identified in these studies, it is necessary to design an online catering ordering information system that can address existing challenges and improve the quality of catering services.

METHODS

The following are the overall stages of activities according to the software development life cycle using the Prototype method:

1. Initial Requirements Gathering
2. System Design
3. Implementation / Coding
4. Testing
5. Maintenance

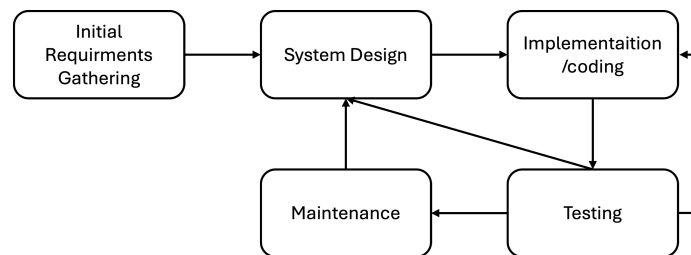


FIGURE 1. The Prototype Methodology for the Online Catering Ordering Information System

Current System Analysis

1. Customer Opens the Catering Ordering Website
2. Customer Selects a Catering Package Menu
3. Customer Places an Order
4. Customer Confirms the Order
5. System Sends a Notification to the Admin
6. Admin Processes the Order
7. Admin Confirms the Order
8. System Sends Confirmation to the Customer
9. Customer Makes the Payment
10. System Processes Delivery and Updates Status
11. System Stores the Order History

Functional Requirements

Functional requirements describe the core features that the system must provide in order to operate according to its objectives [8], [9], [10]. The functional requirements of the online catering ordering system are as follows:

1. The system must be able to record customer data (name, address, contact number, email).
2. The system must be able to record catering order details (package type, number of portions, delivery date, special notes).
3. Customers must be able to place catering orders online through an interactive form.
4. The system must display menu options (à la carte/buffet) to customers.
5. The system must store order history for each customer.
6. Admin must be able to view and verify each incoming order through the admin dashboard.
7. Admin must be able to update order status: Pending, Processing, Delivered, Completed.
8. The system must manage the menu database, including adding, modifying, or deleting catering menu items.

- The system must generate sales reports for the admin.

Non-Functional Requirements

Non-functional requirements are related to the quality and performance of the system rather than direct features [11]. The non-functional requirements are as follows:

- Responsiveness:
 - The system must be accessible from both desktop and mobile devices (mobile-friendly).
- Security:
 - Customer personal data must be encrypted (name, address, phone number).
 - The system must provide authentication mechanisms for both customers and admins.
- Availability:
 - The system must be accessible 24/7 with minimal downtime.
 - The system must be able to handle at least 100 active orders simultaneously.
- Performance:
 - The system must provide a maximum response time of 2 seconds for each transaction (form submission, menu loading, etc.).
- Data Backup:
 - The system must perform automatic daily backups.
- Usability:
 - The system interface must be simple and easy to use, even for non-technical users.
 - Menus and buttons must be clear and use easily understandable language.
- Scalability:
 - The system must be easily extendable to support more features, customers, and orders in the future.

System Design

- Entity Relationship Diagram (ERD)

The ERD presented is a visual representation of the database structure in the catering ordering system [12], [13]. This ERD illustrates the relationships among several key entities, namely: Customer, Order, Menu, and User.

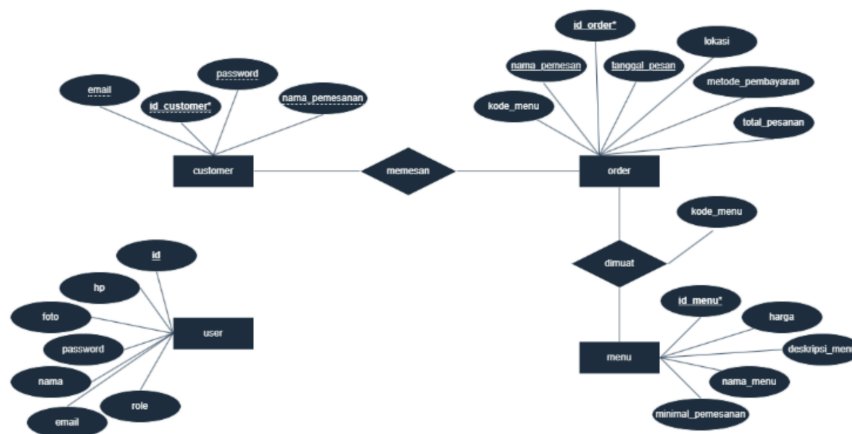


FIGURE 2. Online Catering Ordering Information System

The Entity Relationship Diagram (ERD) illustrates how customer data, orders, menu lists, and system users are interconnected within the system. Through the use of primary keys and foreign keys, the relationships among entities become clear, thereby facilitating the implementation of a structured, efficient, and integrated database.

2. Use Case Diagram

The Use Case Diagram illustrates the main functionalities of the food ordering system from the perspective of the actors involved. This diagram models the interactions between actors such as customers and admins with the system, and explains which features they are able to access.

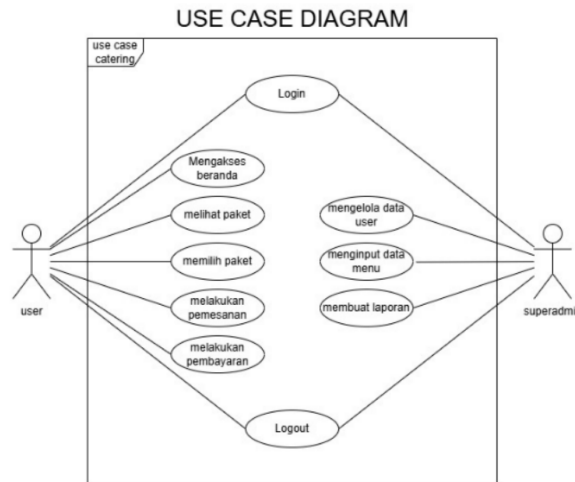


FIGURE 3. Online Catering Ordering Information System

The Use Case Diagram provides an overall view of the designed system, including the main features for both customers and admins. This diagram is useful in the early stages of software development, as it clarifies user requirements and the functional boundaries of the system to be developed.

3. Class Diagram

A class diagram is a representation of a system's structure in the form of classes along with their attributes and methods, as well as the relationships between classes (such as association, aggregation, composition, or generalization).

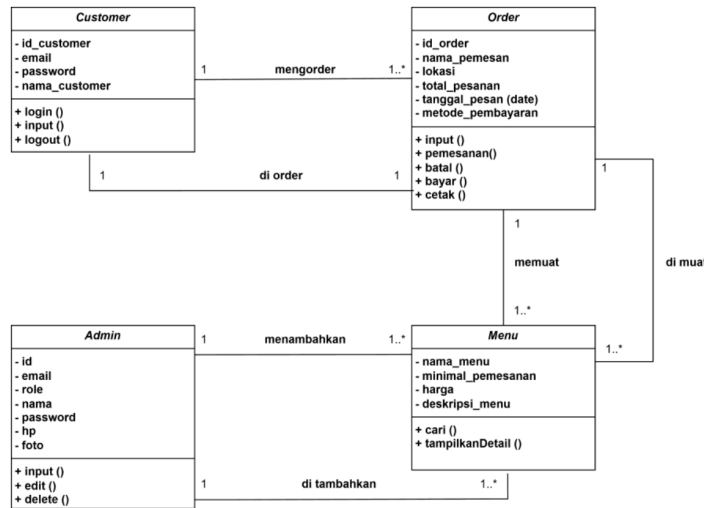


FIGURE 4. Online Catering Ordering Information System

This diagram shows the complete structure of the catering ordering system:

- Customers place orders through the Order entity
- An Order consists of multiple Menu items
- The Admin manages the Menu

4. Activity Diagram

An Activity Diagram illustrates the flow of activities or business processes within a system, both for users (such as customers or admins) and for the system itself. This diagram shows the sequence of steps taken, decisions made, and any parallel flows if applicable.

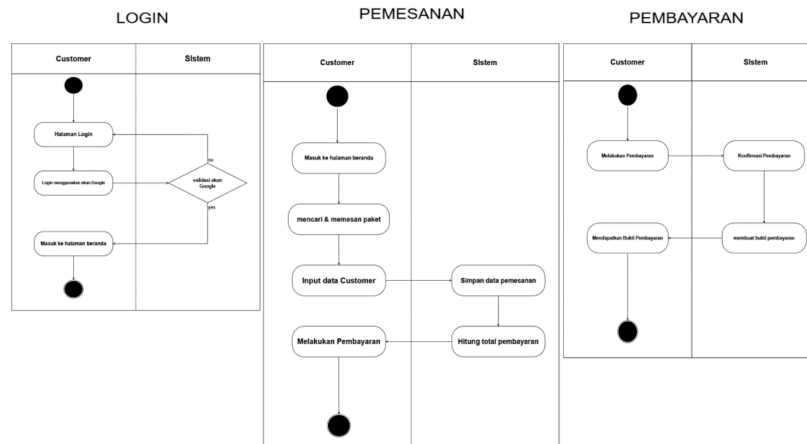


FIGURE 5. Activity Diagram Online Catering Ordering Information System

This diagram depicts the workflow of the catering system from the perspectives of both the user (customer) and the system separately, including login, ordering, and payment activities.

5. Sequence Diagram Customer

This Sequence Diagram is divided into three main parts representing the interaction processes between the customer and the system in three scenarios: Login, Ordering, and Payment.

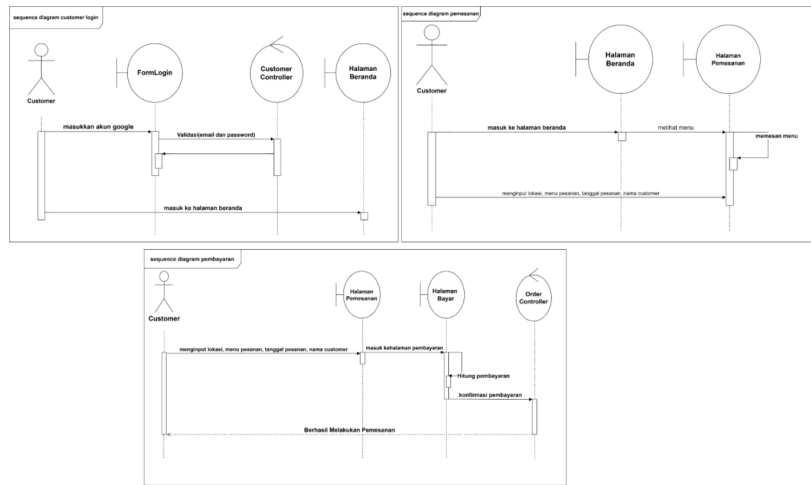


FIGURE 6. Sequence Diagram – Customer

This diagram sequentially depicts how the customer interaction process occurs within the catering system from start to finish:

- Logging into the system,
- Placing a catering service order,
- Completing the payment process.

This sequence diagram helps developers understand the order of interactions and the responsibilities of each system component.

6. Sequence Diagram Admin

Describes the login procedure and the Admin's management of menu data, covering activities from logging in to adding, editing, and deleting menu items in the system.

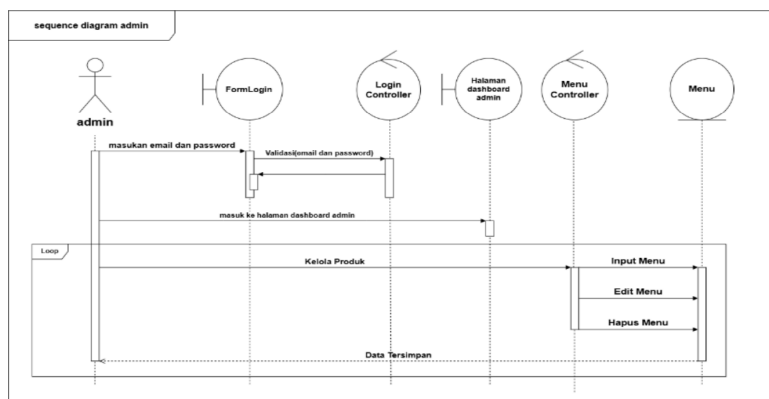


FIGURE 7. Sequence Diagram – Admin

This diagram shows the interaction between the admin and the system during the login and menu management processes, with a structured workflow:

- Login first
- Access the admin dashboard
- Manage product data (menu) by adding, editing, and deleting items.

RESULTS AND DISCUSSION

User Interface Design

1. Homepage
Displays the main navigation menu, product categories on the left side, and a promotional slider in the center. There is also a top products section featuring a list of buffet menus complete with prices, categories, and ratings. The design is clean and facilitates users in selecting and placing orders.

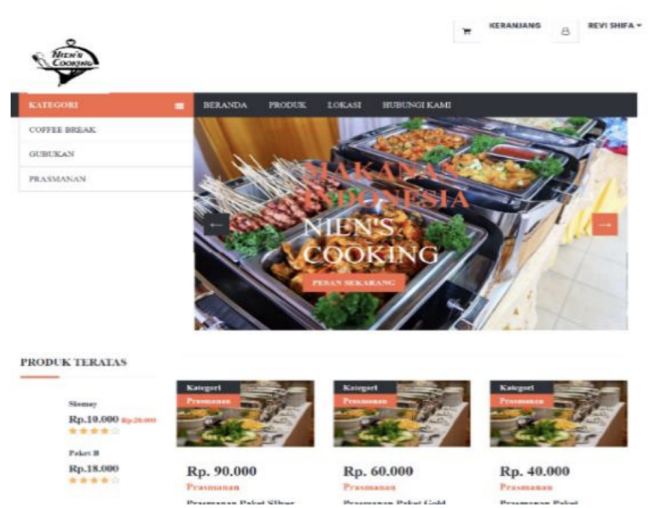


FIGURE 8. Home Screen User Interface Design

2. Account Screen
Shows user information in real-time upon successful login. This interface enables users to view their account details and navigate to other sections of the application.

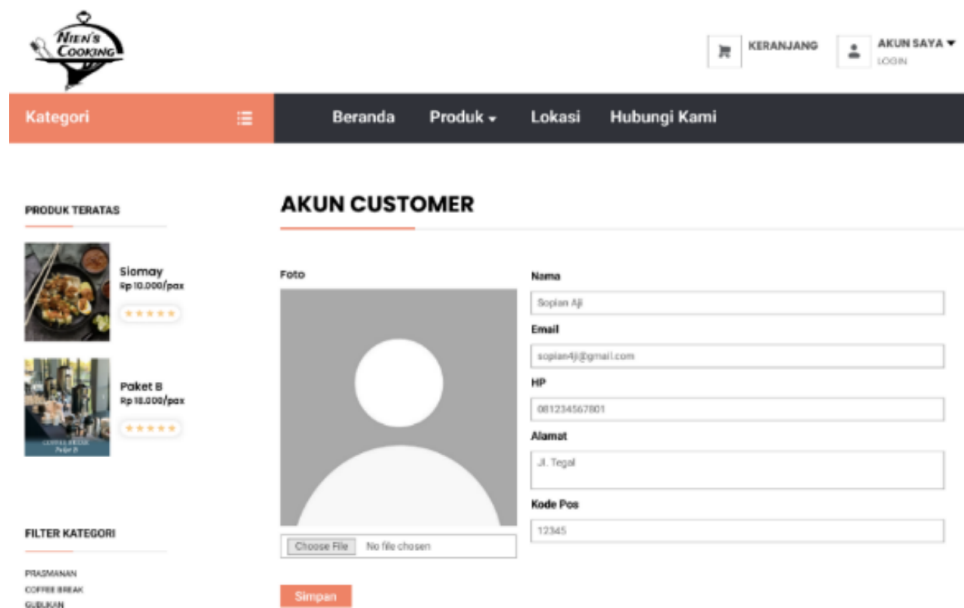


FIGURE 9. Account Screen User Interface Design

3. Product Detail Screen

This page presents comprehensive details of the available menu items.

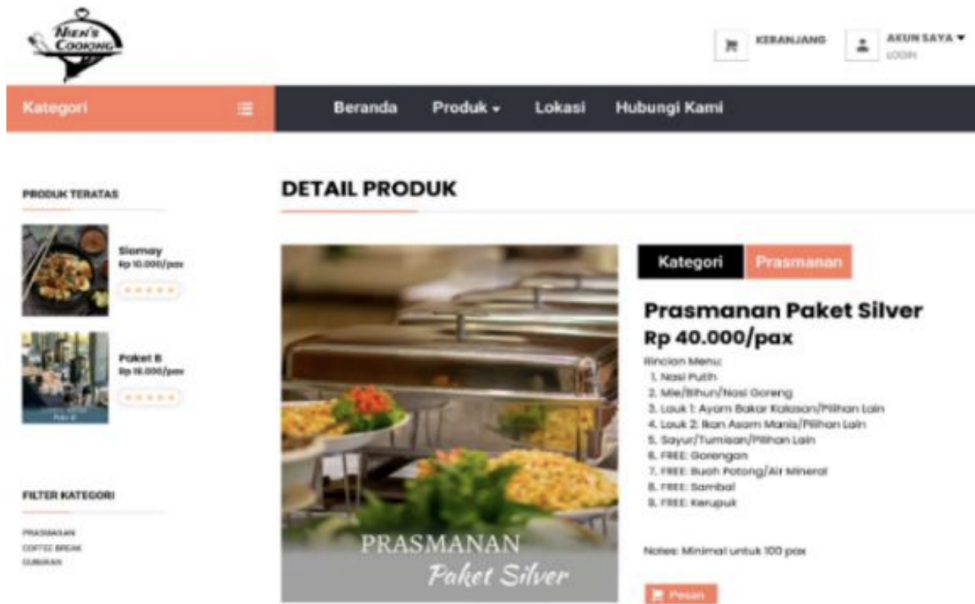


FIGURE 10. Product Detail Screen User Interface Design

4. Cart Screen

Illustrates how users manage items intended for purchase. The design features include an order summary table, quantity update buttons, and automatic price calculation.

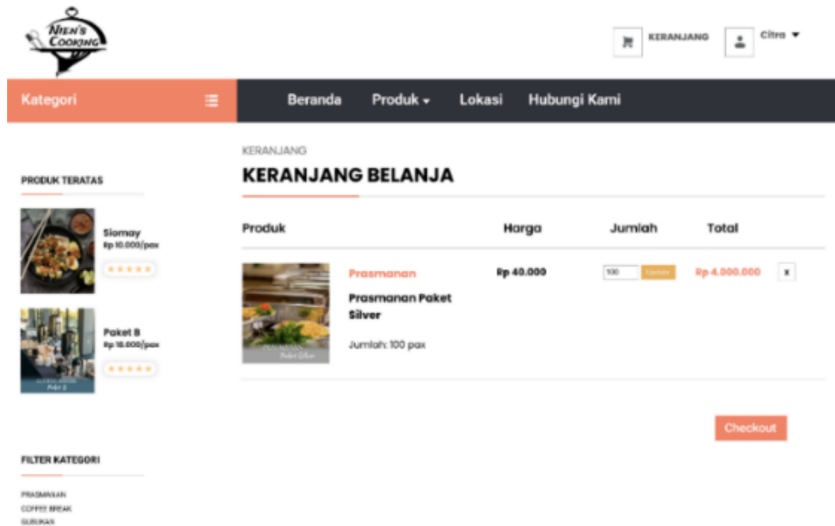


FIGURE 11. Cart Screen User Interface Design

5. Checkout Screen

This page functions as the final confirmation step. It includes a form for address input, payment method selection, and a summary of the total charges.

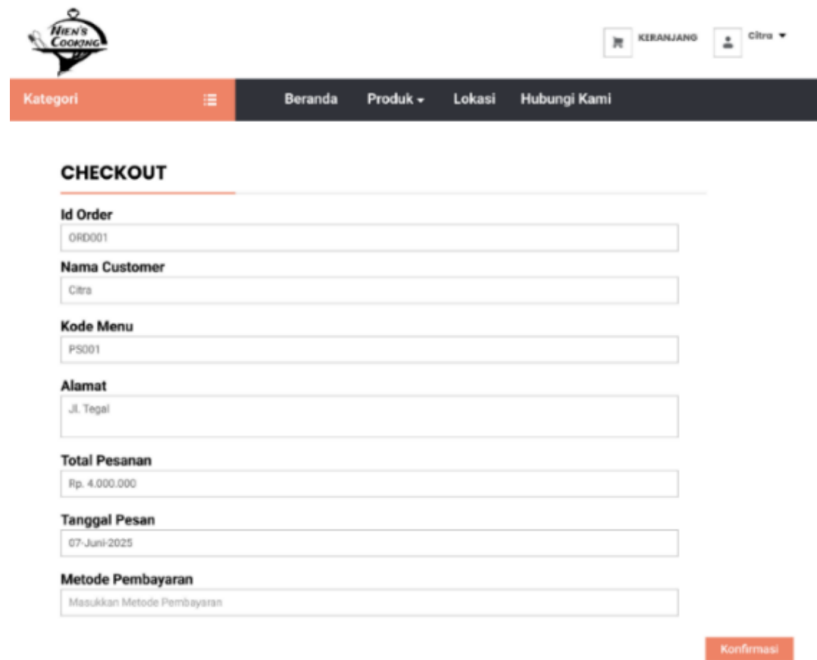


FIGURE 12. Checkout Screen User Interface Design

6. Purchase Receipt Screen

Shows the final output after the checkout process is completed successfully. This serves as a proof of order that can be downloaded or printed and includes comprehensive details such as customer name, order specifics, total amount, and payment status.



FIGURE 13. Purchase Receipt

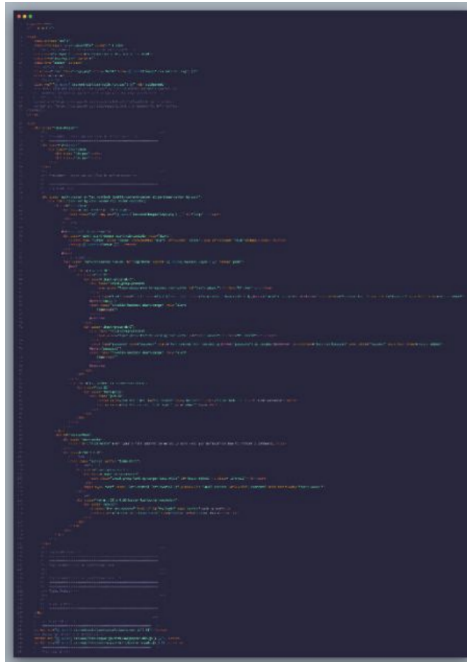


FIGURE 16. Admin Login Code Implementation

Testing

A. Login Testing

Objective: To verify the login validation using the combination of email and password.

TABLE 1. Login Testing

No	Test Scenario	Test Case	Expected Result	Test Result on PC	Conclusion
1	Type a valid email but leave password empty, then click the login button	email: admin@gmail.com password:-	System rejects and displays "Login Failed" message	Matches expectation	Valid
2	Leave email empty but type a valid password, then click the login button	email:- Password: P@55word	System rejects and displays "Login Failed" message	Matches expectation	Valid
3	Leave both email and password empty, then click the login button	email:- password:-	System rejects and displays "Login Failed" message	Matches expectation	Valid
4	Type a valid email and password, then click the login button	email: admin@gmail.com password: P@55word	Login successful and admin home page appears	Matches expectation	Valid

B. Ordering Testing

Purpose: To test the product/menu ordering flow from the home page.

TABLE 2. Ordering Testing

No	Testing Scenario	Test Case:	Expected Outcomes	Test Results on PC	Conclusion
1	The user accesses the home page and attempts to order a menu item that is out of stock.	Click the "Add" button to add an item to the cart	The order fails to be added to the cart	Matches the expected outcome	Valid
2	The user accesses the home page and orders a menu item that is available in stock.	Click the "Add" button again to increase the quantity in the cart	The order is added to the cart successfully	Matches the expected outcome	Valid
3	The user removes an item from the cart.	Click the "Delete" button to remove an item from the cart	The item is removed from the cart successfully	Matches the expected outcome	Valid

C. Payment Testing

Objective: To verify the payment process and the system's handling of it.

TABLE 3. Payment Process Testing

No	Test Scenarios	Test Case	Expected Outcomes	Test Results on PC	Conclusion
1	The user selects a payment method.	Select one of the multiple payment methods	User is directed to the Checkout page	Matches the expected outcome	Valid
2	The user is on the Checkout page and fails to complete the payment.	Click the "Pay" button and simulate a failed payment	The system shows the message "Payment Failed: Insufficient Balance"	Matches the expected outcome	Valid
3	The user is on the Checkout page and successfully completes the payment	Click the "Pay" button and simulate a successful payment	The system shows the message "Payment Successful"	Matches the expected outcome	Valid

Maintenance

System maintenance is carried out to ensure that the online catering ordering information system continues to function optimally and can adapt to the evolving needs of users. Since this system is developed using a Prototype approach, maintenance becomes an important part of the continuous development cycle.

The planned types of maintenance include:

- Bug Fixes (Corrective Maintenance): Identifying and fixing technical errors in the system based on user reports.
- System Adjustments (Adaptive Maintenance): Adapting the system to technological changes, such as updates to browsers, devices, or operating systems.
- Performance Improvement (Perfective Maintenance): Optimizing system performance to be faster, lighter, and more responsive based on usage evaluations.
- Data Protection and Backup (Preventive Maintenance): Providing automatic backup systems and data security to prevent loss or leakage of information.
- Periodic Evaluation: The system will be regularly evaluated through user surveys or usage data analysis for continuous improvement.

CONCLUSION

The development of the web-based online catering ordering information system using the Prototype methodology successfully addresses the inefficiencies of manual catering processes, such as order recording errors, delayed information delivery, and data inconsistencies. By incorporating iterative user feedback, the system ensures a user-centric design with features like secure registration, interactive menu selection, dynamic order forms, and robust admin tools for order management and sales reporting. Its responsive interface, accessible across devices, meets non-functional requirements like data security, 24/7 availability, and fast response times. Black-box testing confirmed reliable functionality across login, ordering, and payment processes, effectively handling edge cases. The system enhances operational efficiency, improves service accuracy, and elevates customer satisfaction, providing a scalable solution for catering businesses. Ongoing maintenance ensures adaptability to evolving needs, while future enhancements, such as mobile app integration or advanced analytics, could further optimize performance. This research demonstrates the potential of digital transformation in streamlining food service operations and sets a foundation for similar systems in the industry.

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